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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/909,847	07/20/2001	Alain Izadnegahdar	015559-250	8794

27805 7590 11/05/2004  
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EXAMINER

TUGBANG, ANTHONY D

ART UNIT PAPER NUMBER

3729

DATE MAILED: 11/05/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/909,847

Applicant(s)

IZADNEGAHDAR ET AL.

Examiner

A. Dexter Tugbang

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 01 June 2004.  
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-46, 52-60 and 62-70 is/are pending in the application.  
4a) Of the above claim(s) 28-46, 52-60 and 64 is/are withdrawn from consideration.  
5) ☒ Claim(s) 1-25, 27 and 67-70 is/are allowed.  
6) ☒ Claim(s) 26, 62 and 63 is/are rejected.  
7) ☒ Claim(s) 65, 66 is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.  
10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.  
5) ☐ Notice of Informal Patent Application (PTO-152)  
6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Response to Amendment*

1. The applicant(s) amendment filed on 6/1/04 has been fully considered and made of record.
2. The applicant(s) arguments, see response (pages 16-17), filed 6/1/04, with respect to the merits of the IEEE Publication to Chung et al, have been fully considered and are persuasive. The examiner agrees with the applicant(s) that Chung does not teach the order of steps that requires that the diaphragm wafer be coupled to the base wafer after the sensor cavity has already been formed. Accordingly, the previous 35 U.S.C. 102 and 103 rejections in the Office Action (dated 2/27/04), all of which were directed to Chung et al, have been have been withdrawn.

### *Election/Restrictions*

3. Claims 28-46, 52-60 and 64 continue to stand as being withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 6/1/04.
4. Linking Claim 1 has been found to allowable for the reasons set forth below. Accordingly, the restriction requirement with respect to the inventions of Groups I-A through I-E (in the Office Action dated 2/27/04) has been withdrawn. The claims in Groups I-A through I-E have been rejoined with linking Claim 1 and fully examined on the merits.

***Claim Objections***

5. Claims 1, 9, 10, 11, 19, 25, 26, 62 and 68 are objected to because of the following informalities.

In Claim 1, the phrase of "the thickness" (line 9) should be changed to --a thickness--.

Similar changes should be made in each of Claims 25, 26, 62 and 68.

In Claim 9, the phrase of "said trough" (line 4) should be changed to --a trough--.

In Claim 10, the term --a-- should be inserted after "in" (line 2).

In Claim 11, the phrase of "said first" (line 1) should be recited as --said sensor cavity--.

Similar changes should be made to Claim 19.

Appropriate correction is required.

***Claim Rejections - 35 USC § 102***

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claim 26 is rejected under 35 U.S.C. 102(b) as being anticipated by Mirza et al 5,632,854.

Mirza discloses a method of making a pressure sensor comprising: providing a base wafer 12; forming a cavity 19 (in Fig. 3) in the base wafer; subsequently coupling a diaphragm wafer (either one of layers 26 or 27 in Fig. 4) to the base wafer such that a diaphragm portion of the diaphragm wafer is located over the sensor cavity; reducing a thickness of the base wafer 12

by forming a port 38 (in Fig. 7); and locating a piezo resistive portion 39 on the diaphragm portion.

***Claim Rejections - 35 USC § 103***

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 62 and 63 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mirza et al in view of either Petersen et al (IEEE Publication entitled "Surface Micromachined Structures Fabricated with Silicon Fusion Bonding") or Klima 4,530,734.

Claim 62 contains all of the limitations of Claim 26 with the exception "reactive ion etching". Therefore in Claim 62, Mirza discloses substantially all of the limitations of the claimed manufacturing method except that the sensor cavity in the base wafer is formed by "reactive ion etching".

However, the examiner takes Official Notice that it is conventional, old and notoriously well known in the art to form cavities in base wafers by deep reactive ion etching for the advantages and desirability of producing accurately patterned cavities. As evidence of obviousness, the examiner Petersen et al and Klima as conventional methods of deep reactive ion etching of base wafers.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have formed the sensor cavity of Mirza by the conventional methods of

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deep reactive ion etching, as taught by either Petersen or Klima, to produce accurately patterned cavities.

***Allowable Subject Matter***

10. Claims 1-25, 27 and 67-70 are allowed.

11. Claims 65 and 66 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

12. The following is a statement of reasons for the indication of allowable subject matter.

Regarding Claim(s) 1 and 68, the prior art does not teach all of the limitations of the claimed invention including forming a sensor cavity in the base wafer, and subsequently coupling a diaphragm wafer to the base wafer with the diaphragm wafer including a diaphragm portion, a sacrificial portion, and an insulating layer disposed between the diaphragm portion and the sacrificial portion where the diaphragm wafer is coupled to the base wafer such that the diaphragm portion generally covers the sensor cavity.

Regarding Claim(s) 25 and 65, the prior art does not teach all of the limitations of the claimed invention including forming a sensor cavity in the base wafer, providing a silicon-on-insulator diaphragm wafer including either upper and lower layers or upper and lower silicon layers separated by an insulating layer, and subsequently coupling the diaphragm wafer to the base wafer such that a diaphragm portion is located over the sensor cavity.

Regarding Claim(s) 27, the prior art does not teach all of the limitations of the claimed invention including forming a sensor cavity in the base wafer, and subsequently coupling a

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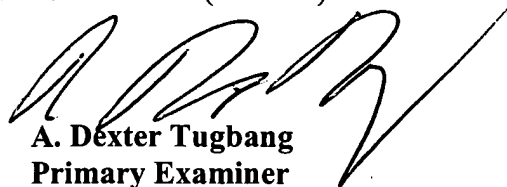
silicon diaphragm wafer to the base wafer by fusion silicon bonding, the diaphragm wafer including a diaphragm portion, at least one of the base wafer or the diaphragm wafer being a silicon-on-insulator wafer having an upper silicon layer, a lower silicon layer and an insulating layer disposed there between, where the diaphragm wafer is coupled to the base wafer such the diaphragm portion generally covers the sensor cavity.

***Conclusion***

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to A. Dexter Tugbang whose telephone number is 703-308-7599. The examiner can normally be reached on Monday - Friday 7:00 am - 3:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Peter Vo can be reached on 703-308-1789. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
**A. Dexter Tugbang**  
**Primary Examiner**  
**Art Unit 3729**

November 1, 2004